5 Year Capital Plan to Address Road Maintenance Needs and Costs in State Parks

February 15, 2018

Section 34.43.(b) of Session Law 2017-57 directs the Department of Transportation and the Division of Parks and Recreation of the Department of Natural and Cultural Resources to develop a five-year capital plan to address road maintenance needs and costs in State parks. Contained herein is the five-year plan that addresses the capital maintenance needs and costs of the major assets of the state park roads and parking lots which include pavement, vehicular bridges, and drainage pipes. This plan is prepared for the Joint Legislative Transportation Oversight Committee (JLTOC) and Joint Legislative Oversight Committee on Agriculture and Natural and Economic Resources.

Legislative Mandate

Section 34.43. (b) is a follows:

SECTION 34.43. (b) Capital Plan. – The Department of Transportation and the Division of Parks and Recreation of the Department of Natural and Cultural Resources shall jointly develop a five-year capital plan to address road maintenance needs and costs in State parks. The Department shall submit the plan required under this subsection to the Joint Legislative Transportation Oversight Committee and the Joint Legislative Oversight Committee on Agriculture and Natural and Economic Resources by February 15, 2018.

Plan Summary

Based on recent asset inventories and condition assessments, maintenance needs were developed for each asset and from those specific needs, cost estimates were prepared. Each yearly plan addresses preservation needs as well as assets in poor condition. The overall needs and costs for each year are shown in Table 1.

	Drainage Pipes		Pavement - Roads		Pavement - Parking Lots		Bridges		
Plan Year	Pipes to Clean Out/Replace	Cost	Lane-Miles to Treat	Cost	Lots to Treat	Cost	Bridges To Treat	Cost	Yearly Cost
1	177	$370,181	42.17	$1,000,957	0	$0	5	$335,000	$1,706,138
2	102	$321,431	20.85	$739,977	0	$0	1	$100,000	$1,161,408
3	124	$80,600	20.85	$739,977	56	$209,870	2	$31,000	$1,061,447
4	68	$44,200	0.00	$0	12	$177,855	3	$30,000	$252,055
5	68	$44,200	9.30	$46,927	4	$453,040	1	$90,000	$634,167
Total	539	$860,612	93.17	$2,527,838	72	$840,765	12	$586,000	$4,815,215

Table 1: Annual Needs and Costs

Plan Development

To develop a maintenance plan for the state park roads, the physical condition and an inventory of at least the major assets of the roads must be known. Therefore, during the months of August through December 2017, NCDOT conducted a pavement condition survey of all paved park roads and parking lots within a total of 39 state parks. Additionally, a drainage pipe inventory and condition assessment was conducted during this same period for these same facilities. There were a total of 5 parks that did not include any paved road or parking facilities to

be assessed. A bridge inventory and inspection had previously been conducted. From the pavement and pipe condition data collected from our recent inventory efforts as well as the bridge condition data previously collected, it was determined which pavement and bridge treatments are needed as well as which maintenance activities are needed to correct the drainage pipe deficiencies identified. NCDOT has unit cost information available for all recommended treatments and maintenance activities and used those figures to generate cost estimates included in this report.

Drainage Pipes

Summarized below in Tables 2 & 3 are the results of the drainage pipe inventory and condition assessment.

Pipe Quantity	1,109
Most Common Size (15" & 18")	800
Average Length (Feet)	50
Total Length of Pipe (Feet)	56,034

Table 2: Pipe Inventory

Recommended Maintenance	Inventory		Cost	Unit Cost	Unit
Do Nothing	570	Number of Pipes	$0	$0	
Clean Out	463	Number of Pipes	$300,950	$650	Each
Replace	3198	Linear Feet of Pipes for 76 Pipes	$559,661	$175	Per Foot
		Total Cost	$860,611		

Table 3: Pipe Maintenance Needs

To develop the yearly maintenance plan for the pipes that need cleaning out, the percent blocked condition data was used. As shown in Table 4, pipes that are 100% blocked are scheduled for year one, 75% blocked are scheduled for year two, 50% blocked for year 3, and pipes 25% blocked for years four and five.

Plan Year	Pipe Blockage	Number of Pipes	Cost
1	100 %	139	$90,350
2	75%	64	$41,600
3	50%	124	$80,600
4	25%	68	$44,200
5	25%	68	$44,200
Total		463	$300,950

Table 4: Maintenance Plan for Drainage Pipes - Clean Out

Drainage pipes that need to be replaced due to rust or damage account for a major portion of the drainage pipe maintenance need cost. If left unaddressed, these deteriorated pipes could lead to roadway slope washouts or road cave-ins that could result in unnecessary, increased expenditures. Therefore, this maintenance need is scheduled for year one and two as shown in Table 5 on the following page.

Plan Year	Number of Pipes	Cost

1	38	$279,831
2	38	$279,831
Total	76	$559,661

Table 5: Maintenance Plan for Drainage Pipes – Replacement

Pavement - Roads

Outlined below in Table 6 are the results of the road pavement inventory and condition survey.

Recommended Treatment	Cost	LANE-MILES	LENGTH (miles)
Do Nothing	$0	158.39	90.27
Crack Seal	$53,104	10.44	5.64
Mill 0.75 & Replace S4.75A	$2,260,131	64.19	34.70
Seal Crack and Double Seal	$167,676	9.23	5.25
Total	$2,480,911	242.24	135.86

Table 6: Paved Roads Inventory and Maintenance Needs

The yearly pavement treatment plans for roads are based on a combination of pavement preservation treatments and thin overlays. Year one includes 19.67 lane-miles of crack sealing and double sealing to preserve the good pavement that is just starting to deteriorate and 22.5 lane-miles of mill and replace to treat roads that are in poor condition with severe cracking or rutting. The remaining roads that need to be milled and replaced (41.69 lane-miles) will be treated during year two and three. No roads will be treated during year four but for year five, 5.1 miles (9.3 lane-miles) of the "Do Nothing" mileage that currently has light cracking will be crack sealed. See Table 7 for an outline of paved roads, five-year maintenance plan.

Plan Year	Treatment	Lane-Miles to Treat	Cost
1	Crack Seal	10.44	$53,104
1	Seal Crack and Double Seal	9.23	$167,676
1	Mill 0.75 & Replace S4.75A	22.5	$780,177
2	Mill 0.75 & Replace S4.75A	20.85	$739,977
3	Mill 0.75 & Replace S4.75A	20.85	$739,977
4	N/A	0.00	$0
5	Crack Seal	9.30	$46,927
Total		93.17	$2,527,838

Table 7: Maintenance Plan for Paved Roads

Pavement – Parking Lots

Outlined below in Table 8 are the results of the parking lots pavement inventory and condition survey.

Plan Year	Recommended Treatment	Number of Parking Lots	Cost
	Do Nothing	310	$0
3	Crack Seal	56	$209,870
4	Overlay	12	$177,855
5	Mill 0.75 & Replace S4.75A	4	$453,040
Total		382	$840,765

Table 8: Parking Lots Inventory and Maintenance Needs

Maintenance needs for parking lots are addressed in plan years three through five so that the major needs of park roads can be addressed in years one through three. The yearly pavement treatment plans for parking lots are based on a combination of pavement preservation treatments and thin overlays and the number of parking lots treated. Year three includes the 52 lots that need crack sealing to preserve the pavement in a good condition and because it is the largest quantity of maintenance needs. Year four addresses the twelve parking lots that need a pavement overlay and year five addresses five parking lots that need a mill and replace treatment. See Table 8 for an outline of parking lots, five-year maintenance plan.

Bridges

Outlined below in Table 9 are the results of the bridge inventory and inspection. There are a total of 23 state park owned, vehicular traffic bridges within our state parks. 12 of those 23 bridges have identified maintenance needs.

Type of Maintenance Required	Number of Bridges Affected	Total Cost
Debris Removal	1	$ 10,000.00
Paint Steel Beams	1	$ 100,000.00
Repair Concrete Beams	3	$ 30,000.00
Repair Timber Substructure	1	$ 25,000.00
Replace Expansion Joints	1	$ 6,000.00
Replace Steel Beams and Timber Decking	4	$ 390,000.00
Repair Timber Superstructure	1	$ 25,000.00
Grand Total	12	$ 586,000.00
NOTE: Includes Maintenance of Bridges That May Require Replacement		

Table 9: Paved Roads Inventory and Maintenance Needs

The yearly bridge maintenance plans were identified by our Structures Management Unit and are based on treatments that are most critical to those that are least critical to maintain the structural integrity of the bridges. It should be noted that the figures in Table 9 include dollar amounts for maintenance treatments on 3 existing bridges considered to be structurally deficient. As such, near term replacement of these structures should be considered. Anticipated cost to replace these 3 structures, based on current design standards, is estimated to be $1.5 M. See Table 10 below for the five-year maintenance plan for bridges.

Plan Year	Maintenance Treatment	Number of Bridges	Cost
Year 1	Replace Steel Beams and Timber Decking	3	$ 300,000.00
	Debris Removal	1	$ 10,000.00
	Repair Timber Substructure	1	$ 25,000.00
Year 1 Total	**Total Number of Bridges Needing Treatment: 5**	**-**	**$ 335,000.00**
Year 2	Paint Steel Beams	1	$ 100,000.00
Year 2 Total	**Total Number of Bridges Needing Treatment: 1**	**-**	**$ 100,000.00**
Year 3	Repair Timber Superstructure	1	$ 25,000.00
	Repair Expansion Joints	1	$ 6,000.00
Year 3 Total	**Total Number of Bridges Needing Treatment: 2**	**-**	**$ 31,000.00**
Year 4	Repair Concrete Beams	3	$ 30,000.00
Year 4 Total	**Total Number of Bridges Needing Treatment: 3**	**-**	**$ 30,000.00**
Year 5	Replace Steel Beams and Timber Decking	1	$ 90,000.00
Year 5 Total	**Total Number of Bridges Needing Treatment: 1**	**-**	**$ 90,000.00**
Grand Total:		**12**	**$ 586,000.00**

Table 10: Maintenance Plan for Bridges

As stated previously, for the five year plan window, there are 12 bridges with identified maintenance needs. The total cost to address these identified needs is estimated to be $586,000.

Other Maintenance Needs

In addition to pavement, pipes, and bridges, our state parks contain other transportation assets with maintenance needs. These assets include unpaved roads, pedestrian bridges, signs, pavement striping, and vegetation. The maintenance needs of these assets are more reactive than planned and the annual maintenance cost is typically minor compared to the previously outlined assets. For example, the annual cost of machining all unpaved roads is approximately $8,000. Additionally, emergency maintenance repairs that occur throughout the year are not included in the plan.

Plan Limitations

The five-year maintenance plan outlined above is based on a snapshot of the current condition of the assessed assets within our State Parks. Over a five year period the condition will worsen, and therefore the maintenance need will increase due to parks expanding, increased usage, current maintenance needs not being addressed, and older assets deteriorating at a faster rate. It is recommended that a condition assessment of the assets be conducted at least biennially and the plan updated accordingly. In addition, due to the varying locations of the state parks throughout the State, the recommended treatments identified per year are independent of park locations and may not represent the most efficient, or cost effective means by which maintenance deficiencies should be addressed. Cost savings could potentially be realized by developing bundled maintenance activity contracts within parks that are close in proximity, or in logical packages that could maximize the work accomplished within each individual contract. In addition, unit costs figures used to generate estimates are based on statewide averages, therefore costs to perform individual maintenance work items may vary across the state, depending upon region.